

IN THE CLAIMS

Please amend claims 1 through 6, and add claims 7 and 8, as follows:

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1 (thrice amended). A memory system, comprising:

a plurality of defect-adaptive memory devices, each of said plurality of defect-adaptive memory devices having a first region [and a second region, said first region] for sequentially storing parity information [needed] for data recovery and [said] a second region for storing data;

a plurality of caches, each of said plurality of caches [being] respectively [connected] coupled operatively to a corresponding one of said plurality of defect-adaptive memory devices, each of said plurality of caches adapted for storing parity information [needed] for data recovery for a corresponding one of said plurality of defect-adaptive memory devices; and

a controller [connected] operatively coupled to each defect-adaptive memory device of said plurality of defect-adaptive memory devices and to each corresponding cache of said plurality of caches [that is respectively connected to a corresponding one of said plurality of defect-adaptive memory devices], said controller comprising a first means for selectively controlling writing and reading of parity information needed for data recovery in said first region of each corresponding one of said plurality of defect-adaptive memory devices, a second means for selectively

20 obtaining parity information needed for data recovery from said first
21 region of each corresponding one of said plurality of defect-adaptive
22 memory devices, and a third means for selectively storing parity
23 information needed for data recovery obtained from said first region of
24 a corresponding one of said plurality of defect-adaptive memory devices
25 in a predetermined corresponding one of said plurality of caches.

Sub E1
2 2 (thrice amended). The memory system of claim 1, [further comprised of]
3 wherein said controller comprises a means for determining whether data recovery
information is stored in any cache of said plurality of caches.

Sub E1
2 3 (thrice amended). The memory system of claim 1, [further comprised of]
3 wherein the parity information needed for data recovery [being] is stored and [being]
4 is sequentially arranged from the most outer cylinder on a recording medium in each
corresponding one of said plurality of defect-adaptive memory devices.

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2 4 (thrice amended). The memory system of claim 3, [further comprised of]
3 wherein parity information [needed] for data recovery [being] is modified to a value
obtained through a calculation of new data recovery information.

1 5 (thrice amended). The memory system of claim 4, [further comprised of]
2 wherein parity information [needed] for data recovery [being] is obtained by

31 } performing an exclusive-OR[ing of] operation on previous data, parity information
4 corresponding to the previous data, and new data.

1 6 (thrice amended). A redundant array of inexpensive disks (RAID) system,
2 comprising:

3 a plurality of disk drives, each of said plurality of disk drives including a first
4 region having a plurality of data blocks for storing data and [another] a
5 second region having a predetermined number of parity blocks for
6 storing parity information [needed] for data recovery;

3 } a plurality of caches, each of said plurality of caches [being] respectively
[connected] coupled operatively to a corresponding one of said plurality
9 of disk drives, each of said caches adapted for storing parity information
10 [needed] for data recovery; and

11 a controller [functionally connected] operatively coupled to each disk drive of
12 said plurality of disk drives and to each corresponding cache of said
13 plurality of caches, said controller adapted for selectively controlling a
14 write operation of data and parity information [needed] for a data
15 recovery in each corresponding disk drive of said plurality of disk
16 drives, said controller comprising [by a process of]:

17 a first means for selecting [determining] a predetermined disk
18 drive of said plurality of disk drives upon receipt of a data
19 writing instruction from a host computer;

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20 a second means for reading old data from the predetermined disk
21 drive of said plurality of disk drives;

22 a third means for determining whether old parity information
23 corresponding to the old data corresponding to the
24 predetermined disk drive of said plurality of disk drives is
25 accessed in a corresponding cache of said plurality of
26 caches;

27 [upon the old parity information corresponding to the
28 predetermined disk drive of said plurality of disk drives not
29 being accessed in the corresponding cache of said plurality
30 of caches,] a fourth means for reading the old parity
31 information from the predetermined disk drive of said
32 plurality of disk drives, upon the old parity information
33 corresponding to the predetermined disk drive of said
34 plurality of disk drives not being accessed in the
35 corresponding cache of said plurality of caches, and for
36 then loading the corresponding cache of said plurality of
37 caches with the old parity information;[, and then said
38 controller performing the following process:]

39 a fifth means for obtaining new parity information by performing
40 an exclusive OR operation on the old data, the old parity
41 information and new data;

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42 a sixth means for loading the corresponding cache of said
 43 plurality of caches with the new parity information; [and]
 44 a seventh means for writing the new data in said region for
 45 storing data in the predetermined disk drive of said
 46 plurality of disk drives and writing the new parity
 47 information in said another region for storing parity
 48 information in the predetermined disk drive of said
 49 plurality of disk drives; and
 50 an eighth means for reading old parity information from the
 51 predetermined disk drive, in the event that no old parity
 52 information exists in a corresponding cache, and for then
 53 moving said old parity information read from the
 54 predetermined disk drive to the corresponding cache to
 55 provide an update of the parity information.

cy 2 --7. In a method of writing data to, and reading data from, a redundant array
 3 of inexpensive disks (RAID) system, said method comprising steps for sequentially
 4 storing information for data recovery in a first region of a disk, storing information
 5 comprising data in a second region of the disk other than the first region, controlling
 6 writing and reading of information by means of an electronic controller unit, and
 7 caching information for data recovery, *the improvement comprising* a step for
 reducing overhead during a read operation for data recovery and thereby improving

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data input-output performance.

1 --8. The method of claim 7, wherein said step for reducing overhead during a
2 read operation for data recovery and thereby improving data input-output
3 performance comprises steps for:

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4 (a) coupling each one of a plurality of caches to each corresponding one of a
5 plurality of disks, whereby each disk is coupled to one cache;

6 (b) operatively coupling the caches to the controller;

7 (c) storing in each one of the plurality of caches information for data recovery
8 in the disk corresponding to the cache; and

9 (d) determining information for data recovery in a disk by using information
10 for data recovery stored in the cache corresponding to the disk.
